Chapter 2: Social Systems Theory

In the first section of this chapter we give a brief overview of the key concepts of Luhmann's Social Systems Theory, particularly those to be used in the subsequent discussions.[1] The second section of the chapter talks about elements to consider when carrying out the task of observing social systems, particularly the health system with its two sub-systems, medicine and public health.

Concepts

Pervasive in contemporary societies, health systems are straightforwardly recognizable; those who work in them as well as those who look for healthcare assistance have clear expectations about them.

Those studying health systems from an academic perspective observe them as external observers. Nevertheless, observers, health profes-

---

1   A number of books have comprehensive explanations of the concepts mentioned in this chapter. It is advisable therefore that the interested reader consults the attached references for more in-depth presentations of the concepts. The book we published in 2023, *Health as a Social System* (Costa, 2023), has discussions of the concepts and their application to health systems. However we recommend Luhmann (1990, 1995, 2007, and particularly 2013) for extensive detailed conceptual presentations. Furthermore, glossaries of Luhmann's concepts can be found in Baraldi, Corsi and Esposito (2021), and Seidl and Becker (2006).

sionals and patients depart from similar understandings of the systems as a comprehensive singular all-encompassing distinctive whole.

Independent from the types of institutions it is comprised of, and types of expertise available, funding arrangements, structures, distribution of services, organizations, and so on, an observer of systems sees health systems as distinct from the others systems in a society.

The distinction arises primarily from the codes and semantics used by the system. Health systems communicate internally about health, and more specifically about diseases and treatments. The identity of the system does not leave much ground for doubt about its main general social purposes, aims and justifications.

According to Luhmann (2013, p. 44), "system is the difference between system and environment". A system exists vis-à-vis the environment where it strives to keep its distinctiveness, unit and identity.

Everything that is not part of the system belongs to the environment. The system exists because it is distinct from its environment. The distinction system/environment[2] is a foundational concept according to the theory. If this distinction is lost, the system disappears.

For being different from its environment, a system has limits marking the separation between what is internal to the system and what is external to it.

However, a system can observe itself as well as its environment. Particularly, out of the incommensurably vast diversities of elements and relations in the environment, the system observes what is relevant for it and ignores the rest.

In the case of a health system, the attention is primarily directed to human bodies. The human bodies are part of the environment. More specifically, the bodies' internal structures and functions, and what happen to them when diseases affect them, are crucial elements of the environment of the health system.

To deal with health and disease in its environment, a health system deploys the semantics and meanings that constitute the characteristic

---

2   Throughout the book we denote distinctions by separating the two opposite sides with "/" as in "system/environment" mentioned above.

communications belonging to a health system; internal communications occur many thousands of times on a daily basis in any health system in the world.

According to Luhmann (2013), a social system is made of communications and nothing else. Without communication, there is no social system. In written or oral forms, communication is comprised of utterances and information, generating understanding (including misunderstanding) between those engaged in it.

Without understanding, there is no communication. Understanding can be verified by the self-referential functionality of communication, through which those communicating can recursively return to the information and utterances already made and confirm (or not) the agreement on commonly employed meanings.

Recognition and validation of meanings therefore takes place through communications. Only meaningful communications are part of the system; the rest is discarded as not being matters of concern or as just noise. The system needs to continuously operate with validated communication otherwise it loses its self-reference.

For that matter, social systems maintain operational closure, by which their meanings are only communicated and validated internally. Only internally can the codes and semantics employed by the system be corroborated and understood. Health professionals, and only them, have the prerogative and responsibility to make meaningful statements recognizable and acceptable by other health professionals operating in the system.

Operational closure is a fundamental step in the constitution of a social system. A social system can only exist after having established its closure – that is, after creating limits for exclusive meaningful communications distinct from communications of other systems in its environment.

The history of a social system indicates the processes by which the closure took place and the system started to rely exclusively on the semantics of its internal universe of communications.

Without operational closure, a system loses distinctiveness and its communications can be appropriated by other social systems. In such

cases, there is no difference between system and environment. Because of that, each social function system in the society preserves and communicatively reproduces its unique distinctive codes and semantics.

This process is called *social differentiation* (Luhmann, 2007). By that, each social function system (the political, legal, economic, education, religious, art, media, health, and so on) differentiates itself (its communications) from the others, erecting clear boundaries that cannot be crossed by the other systems.

A function system cannot communicate inside another function system, otherwise one would be destroyed; so, by the same token, a function system cannot be subordinated to another and no function system occupies the centre or the hierarchical top of a society structured according to function systems differentiation.

Function systems can only communicate internally using exclusive semantics. However, function systems can enter into *structural coupling* (more on this later) by observing each other. Organizations, though, are social systems that can communicate with each other, because they have inside them sections that belong to the same function system, and those sections can understand each other's semantics (Knudsen, 2012). (See more on this topic later in this section.)

The functional differentiation of contemporary societies started around the eighteenth century. Then function systems became the prevalent form of social structuring, as they still are in current societies. Functional differentiation allows any member of the society to participate in any system; this is another important feature of functional differentiation.

The systems are open to the society in the sense that anyone can become, for instance, a health professional or a patient at some point in their lives, independent of characteristics such as place of birth or family background. In the same way, anyone can on one side be appealing to a legal system or, on the other, be a legal professional dealing with the case. In this way, legal systems are open to all members of the society. Likewise, anyone can be part of the political system, either as governing or governed, or the economic system as a buyer or seller.

Before societies became structured according to function system differentiation, the primary differentiation was according to segments. In segmentary societies, the social location and identity of any member was determined first by the place of birth/residence and second by the family/tribe the individual belonged to. Any individual would be socially recognized (as well as self-identified) as being from a certain place and family. Nothing else would be necessary for creating a social identity.

Then, segmentary societies gradually became internally differentiated according to strata. In stratified societies, any person could be either a member of the dominant stratum (aristocrats and monarchs), or a member of the lower stratum, as typically represented in the Middle Ages by the feudal order of noble landowners and peasants. In that case, a person would be assigned to one or the other stratum by birth.

With progressive differentiation of members of the lower stratum into intermediate categories of craftsmen, artisans, skilled doers, soldiers, public servants, and so on, possessing valuable skills and the ability to accumulate property, new structures for society membership emerged. These new structures progressively developed into the function systems of contemporary societies.

But this progress was not the result of accumulation of stratified structures; the notion of accumulation does not explain the emergence of functions. A function such as political, legal, economic or religious is distinct from all the others; no function is subordinated to any other or has its creation decided by other functions.[3]

---

3   Our description of social differentiation in this book is brief and simple, it is far from giving the full breath of Luhmann's conceptual architecture on this topic, which is explained in details in a 144-page chapter of his book *La Sociedad de la Sociedad* (2007), where he also talks about differentiation between centre and periphery and the overlapping of differentiations, as we can see today forms of structural differentiation coexisting in the same society, with functional differentiation being the primary one. We understand that those macro-social differentiations were not the driving force for the constitution of health as a social system. We rather see differentiations as contextual macro-structural factors favorable and supportive for the development of the health system. In this book, we try to explain that the social differentiation of health as a social

The function system is in charge of itself and its own reproduction – that is, reproduction of the meanings that distinguish it from all the other meanings. A system thus differentiated, as a social function system, is solely responsible for keeping its function. We will return to this point later in this section.

Social structures and meanings offer the elements for conducting mutual observations of/by society members. Observations deploy distinctions by which society members can observe each other and each self. Social identities are thus created and become part of individuals' self-references.

To exist, a social function system relies on observations it makes in its environment as well as observations of its internal operations. To carry out observations, a system deploys distinctions that can also be communicated. Communications themes are both about the observations made and, implicitly or explicitly, the distinctions employed for the purpose of observing. In short, observations and the correspondent communications are the life of the social systems.

To remain alive, a social system needs to preserve its internal communication possibilities, reproducing them through the validated recognizable semantics. The reproduction of a social system can only be self-reproduction, as the social system has exclusive use of its distinctive semantics. No other system can do that for it.

In technical terms, the self-reproduction of a social system is called autopoiesis. This means the reproduction of the system by the means the system itself produces. Only the system can produce the means (meanings) for its own reproduction.

Furthermore, Luhmann identifies three types of communication-based social systems: *interactions*, *organizations* and *function systems*. Most of what has been said before are characteristic of function systems; however, it should be emphasized that *function systems*' communications develop from the base of a binary code that is uniquely used by the respective system. For instance, the legal system fundamentally operates

---

system was mainly built from within the health system itself. This is enough on this topic for the moment; we talk a lot about this theme throughout the book.

with the code legal/not legal, as the health system operates with the code healthy/sick. One side of the code leads to further communications within the system; it is the connective side, linking one communication to the next, while the other remains as the reference, reflection side. Within a health system, in the medical sub-system, there is not much to communicate about a healthy individual; the communication in these cases stops. However, within the public health sub-system, healthy populations can be further distinguished with the deployment of the at-risk/not-at-risk distinction, being the at-risk connecting side of the binary code. Public health keeps central to its concerns and communication the identification of populations at risk and consequently the preventive measures to be deployed to reduce the risks. The not-at-risk side remains as the reference/reflection side. We will return to the topic of binary codes in other sections; for the moment, we revisit the types of social systems.

Interactions are systems established by communication between two or more people where presence is required, in a face-to-face encounter or using electronic media. Once the communication ends, the system also ends. Those participating in the meeting may or may not, precisely or not, recall it and keep memories of it, which can be brought out in future meetings; but this is not a necessary condition for the existence of such system. The participants may never meet again.

Organizations are systems characterized by two things: membership and decisions. Typical of an organization are the selections of those who are members in contrast with all the others. Additionally, organizations perform a type of communication characterized as decision. Only members can make decisions in an organization. Without the combination of these two elements, decisions and members to make decisions, there is no organization.

Having gone through these basic concepts of the theory, the final two to be added to this very brief description are the concepts of *self-reference* and *complexity*. These themes are central in our discussion in this book and will appear frequently in most chapters.

Self-reference is constructed through processes of making distinctions and selections, and their deployment in observations and commu-

nications. Luhmann (1990, p. 123) says: "Self-referential systems are able to observe themselves. By using fundamental distinction schema to delineate their self-identities, they can direct their own operations towards their self-identities". A function system is both a first- and second-order observer. It is a first-order observer by observing the environment and the system's internal dispositions. It is a second-order observer as it performs observations of observers, including observing itself as observer as well as observing observers observing it.

Self-reference thus adds the complexity a system needs to survive among systems that also perform self-observations. Self-reference is established on one side of a distinction where the other side is hetero-reference – that is, what *is not* the system. With that, a system can observe that other systems also have their own self-references.

The capacity of observing other systems creates the possibility of what the theory calls *structural coupling*, by which different systems can achieve a certain degree of coordination without communicating with each other, just observing and acting in correspondence to what they independently observe.

A system capable of self-reference produces self-descriptions, creating therefore a structural predisposition for observing and communicating about itself and its environment. Self-descriptions guide the selections the system makes, organizing them in a more systematic way. The descriptions can be handed down and more easily remembered and connected to each other. We can say that preservation of self-descriptions is the same as maintenance of identity. A system surely dedicates efforts to keep the descriptions it makes of itself; however, the system may also change them, when the need arises. Self-descriptions are contingent i.e. they are neither necessary nor impossible and can be different (this is Luhmann's definition of *contingency*).

Studying systems' self-references, one may observe that self-descriptions may change over the course of the life of the system. The contingent character of self-description thus becomes evident. But a system cannot afford to dismiss all self-descriptions; on the contrary, while maintaining self-descriptions, the system corroborates that those are the only valid ones and are permanent; the contingency is noted by

observers, while the system on the other hand strives to confirm and preserve its assumed definite "nature". This way contingency retreats from sight and becomes latent.

When discrepancies between the self-descriptions and the actual observations the system make of itself and its environment become problematic (when self-descriptions for instance become obsolete), the system needs to make an effort to strike a new balance between the descriptions it still needs to preserve and the ones it needs to change or discard. The history of the self-reference of a system is therefore the narrative of those instances of changing and/or preserving self-descriptions. This leads us to the theme of complexity.

The complexity of systems capable of self-reference is prone to increase, as they are not, as called in cybernetic jargon, "trivial machines".[4] Trivial machines deliver the same results when they face the same inputs. They are predictable. Non-trivial machines, on the other hand, by being able to observe their own processes of producing results from observed inputs, become highly complex. Correspondingly, they become unpredictable, with open possibilities of generating unforeseen results. However, as an evolutionary advantage, with the increase in complexity, a self-referenced system can progressively address additional complexities observed in its environment.

To clarify the concept of complexity in Luhmann's theory, in a simple way we refer to complexity when the number of elements and relations between the elements surpasses the capacity of the system to recognize and deal with them. The system may realize that there are elements and relations that are not well known, as there are also known unknowns and unknown unknowns. The system is thus aware of the information deficit it lives with and the respective gaps in information. We will use these references to characterize complexity in the next chapters, emphasizing the configuration of complexity in terms of elements and relations among elements, particularly causality relations.

––––––––––––––––––

4   In his books, Luhmann often refers to Heinz von Foerster in relation to cybernetic concepts and particularly "trivial machines". Technical explanations of "trivial machines" can be found in Foerster (2014).

We can conclude the section by explaining that complexity is a relative attribution of what is observed in correspondence to the system's observation capabilities. Something is temporarily complex because the observing system does not command the necessary observational distinctions and capacities. Complexity is acknowledged where there are insufficiencies in competences to observe. Complexity is not an object in itself; it is a consequence of the temporary limitations of the observer.

Given the incommensurable complexity of the world, any system carrying out observations of its environment needs to reduce complexities by focusing on the elements and relations, and the respective meanings, the system can select to work with. The system needs to represent the environment inside itself. The systems create simplified models of the environment to be able to meaningfully approach it. Meanings are thus embedded in complexities and complexity reduction attempts; a meaning construction requires selecting out all other possibilities apart from the elected one. To be meaningful, something needs to be separated and distinguished from the complexity it is immersed in – a "sea of noises". We will return to the topics of complexity and meaning at some points in the book where the explanations can help to clarify the text being discussed.

Observing systems

The history of medicine is a saga of overcoming limitations. To confront the human body and its diseases, the medical observers faced complexities of unknown magnitudes. Indeed, the pull to know better was continuously present alongside the recognition of the limits of what was already known. The unknown was immersed in the insurmountable complexities of the environment of the system.

A system of meanings cannot have direct access to the complexities of the environment; therefore it needs to represent the environment inside the system. For that, the system can observe the environment and internally develop models to make sense of what it has observed. Models reduce the complexities of the environment to manageable sizes. The

system then deals with the representations itself made with the meanings it constructed.

To elaborate those models, the system makes distinctions and selections of the features it considers relevant. Relevance is judged by the system in relation to its own self-references and self-reproduction, and the supposedly acceptable justifications thus put together.

Nevertheless, the representations the system creates of the environment also have their own level of complexities. The system therefore needs to keep the complexities of its observations as well as the complexities of its models to convenient sizes, discarding what the system cannot properly acknowledge or relate inside the constructed model.

In the process of dealing with complexities a system may not have what Luhmann (1995) calls the "requisite variety". He says: "Systems lack the 'requisite variety' that would enable them to react to every state of the environment" (p. 25), and adds that there can be "no point-for-point correspondence between system and environment". He also says:

> "No society can bring about the 'requisite variety' or corresponding degree of complexity of the environment. However complex its linguistic possibilities and however subtle the structure of its themes, society can never make possible communication about everything that occur in its environment" (p. 182).

Let's take an example. From ancient times up to the Middle Ages, to deal with diseases, practising doctors had available to them what from today's perspectives were very simple models, describing the human body as consisting of basic functions and parts affected by the balance between the four humours (blood, yellow bile, black bile and phlegm). Essentially, the four humours was the only explanatory model available; it represented a huge reduction of the complexities of signs and symptoms seen during disease progression.

As any model, the four humours performed the reduction of complexities expected from it by: limiting the *diversity* of elements and relations to be observed in the human body; presenting possible *causality relations* between observable potential causes linked to effects (such as

imbalance in humours due to excess of exercise, food, sex, weather conditions, and so on, predicting the progress of the disease); indicating actions to achieve the expected desirable *effects*. This model could help to make prognoses and create expectations.

The adoption of models were not necessarily accompanied by the expected results, but fundamentally the models made available a structure of meanings orientating the communications among those who were participating in the activities of identifying and treating diseases. Such a base for communication was the initial step towards the closure of the semantic field, to be eventually achieved when meanings started to be used only by initiated practitioners sharing common understandings. The four humours framework was common knowledge and anyone in ancient societies could play and speculate with it.

Fundamentally, the systematization of observations, and collective adoption of the same distinctions to make observations was a major achievement of Greek medicine. The documents written and circulated had a powerful influence in creating the preliminary conditions for the unfolding of what many centuries later would become health systems.

A disease such as tuberculosis, for example, has been around since time immemorial. The descriptions of the symptoms made by Hippocrates and his disciples allow twenty-first-century doctors to recognize them as observations made on patients who almost surely had TB (see Fox, 2022). The distinctions used to carry out the observations are still considered valid. Obviously the arsenal of resources now available to confirm TB in any patient is incomparably more complex. The doctors can see now far more intricate symptoms and causal links, and deploy a range of interventions no one could even have dreamt about in ancient times.

Someone may say that "TB has changed in comparison with what it was then", but we can instead say that the complexities of what is represented inside the system reflects the complexities the system can now observe in the environment. The complexity of the system has increased and therefore also the complexity of the representation the system makes of that particular object in the environment, TB. The

object TB may still be the same; what has changed is the way the system now observes and communicates about it.

What is remarkable, and therefore won for Hippocrates the title "father of medicine", is the setting in motion of the self-maintained process of writing and reading about diseases, and finding in actual patients correspondences with the texts, and adjusting, complementing and enriching the texts for continuous subsequent observations; in that we see the embryonic system dealing with and developing the complexities of its systematic observations.

They would carry out observations on the body of the patient, and with the semantics then available would communicate their understanding to the patient, to patient's families, to assistants and other doctors involved in the process. All these elaborated meanings were part of the beginnings of the complexity of the system starting to take form. Treatment actions could also be observed and translated into communications using meaningful semantics, and the new meanings were thus incorporated into the repertoire of communications and memories of the evolving system.

A new case could add new complexities to the system's representation of the body, if the patient did not react according to the predictions of the causality models. But if there were no substitute meanings, the new complexities appearing in the environment and acknowledged within the system could not destroy the meanings already in use. So the system had to perform operations to somehow turn what appeared to be meaningless into something meaningful; the system, as a communication-based system, could not afford meaninglessness.

Cases could be dismissed, models could be revised, new semantic terms could be created, and new observations could be performed, or any other strategy for assuring the survivability of the system and reproduction of its meanings, preventing disruptions. As far as possible, internal complexity as well as the internal representation of external complexities, had to be kept at manageable and consistent levels.

With these notions in mind, it is possible to trace the evolution of the health system through the stages of social differentiation, analysing the

configuration of systems' internal and external environmental complexities as represented by the system inside itself.

An observer of a system should therefore look at: the *semantics*, identifying the sets of meanings deployed in the system's internal communications; the distinctions and procedures the system deploys in its *observation* of its internal as well as external environments; and the range of *communications*, in any form, that the system maintains.

Semantics indicates the complexities of the concepts used. Semantics orientate observations and are modified by them; observations and semantics have to appear in communications, otherwise they do not exist for the system. So, these three dimensions – *semantics*, *observations* and *communications* – are interlinked and maintain coherence and stability within the sets of meanings the system operates. It is important to remember though that an observer of a system will not be able to reproduce all the complexities of the system they are observing; a social system is always more complex than an external observer can figure out. Nevertheless, the observer can see and analyse the relevant features of the topics of their interests.

In this chapter we have advanced a bit on the topics of Hippocrates and the orientation towards observations in Greek medicine. These points were mentioned here for illustrative purpose. In Chapter 4 on the history of medicine, from its beginnings in Greece in the fifth century BC, topics of self-reference, semantic closure, complexity and systems' self-reproduction will be thoroughly discussed.

As a light-hearted warning, we emphasize that this brief introduction to some of Luhmann's concepts by no means pretends to be comprehensive and complete. Luhmann's conceptualization is rich in details and requires dedicated study to grasp the full extent of his insights. Here we only offered a few hints using simplified versions of the concepts. The reader, we hope, will feel motivated to dig deeper into the Luhmanian world.